

Name: \_\_\_\_\_

Date: \_\_\_\_\_ HR: \_\_\_\_\_

## Expansion and Contraction of Solids: Stretch and Shrink

**Problem:** Are there similarities in how substances expand when heated? Are there similarities in how they behave when cooled? This activity will help you to identify any patterns.

The lengths of solid bars of different materials can be measured at different temperatures using very precise equipment.

The table below shows some of these measurements. You can see that the changes in a 100 cm long bar are very small. If the bar were twice as long, however, the changes would be twice as large. In a very long structure, such as a bridge or a train track, the small changes can add up and become very important.

Material	Length at -100°C (cm)	Length at 0°C (cm)	Length at 100°C (cm)
Lead	99.71	100.00	100.29
Steel	99.89	100.00	100.11
Aluminum	99.77	100.00	100.23
Brass	99.81	100.00	100.19
Copper	99.83	100.00	100.17
Glass	99.91	100.00	100.09
Pyrex	99.97	100.00	100.03

### Procedure:

- Examine the table above and answer the questions below. (4 marks)
  - What similarity do you see in how all the materials react as they warm?
  - In what way do the materials react differently as they warm?
  - Which material expands the most as it warms?
  - Which material expands the least as it warms?

2. Arrange the list of materials in the table in order, starting with the material that expands the most and ending with the one that expands the least.  
(1 mark)
3. What do you notice about your list when you examine how the materials cool and contract? Does the material that expands the most at a high temperature also contracts the most at a low temperature? (2 marks)
4. A baker places a paper cone into the centre of a fruit pie before putting the pie in the oven. Explain why this would keep juice from running out of the pie during baking? (2 marks)